SECTION 15801

FURNACES

PART 1 - GENERAL

1.1 Related Documents

A. All sections of Division 1.

B. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section. Work shall be coordinated with other trades prior to installation to prevent interference and relocations.

1.2 Description of work

A. This Section covers everything necessary and proper for, or incidental to, executing and completing the hot air heating systems required by this Section and as reasonably inferable from the Drawings including, but not limited to, the following:

1. Provide a ceiling mounted warm air oil-fired furnace.

2. Provide a chunk wood furnace.

3. Provide oil transfer pump with all appropriate supply and return lines with fittings and valves.

4. Provide all necessary ductwork and accessories for complete supply and return systems.

5. Provide all necessary controls and power wiring.

1.3 Submittals

A. After award of contract as soon is reasonably possible, the Contractor shall submit copies of submittals for equipment and materials listed below. Submittals shall include catalogue cuts, shop drawings, and descriptive data showing conformance with this Specification for:

1. Oil-Fired Furnace
2. Chunk Wood Furnace
3. Oil Transfer Pump
4. Oil transfer Piping Schematic
5. Grilles
6. B Vent
7.

PART 2 - PRODUCTS

2.1 Materials

A. Oil Fired Warm Air Furnace: Provide one (1) 250,000 Btu output, overhead mounted hot air unit as manufactured by Jackson-Church.

1. Furnace shall be complete with all required operating accessories to meet the requirements of the State of Vermont.

2. Furnace shall include the following:

a) Metal jacket to cover furnace except burner unit.

b) Complete burner unit with proper size nozzle.

c) Two-stage fuel pump with sufficient lift capacity; transfer pump; and burner pump.

d) Filter frames with filters; permanent aluminum type which can be easily removed, washed and replaced.

e) Breeching between furnace and exhaust stack. Breeching shall be same diameter as furnace exhaust.

f) Barometric damper properly installed and of full size of breeching.

g) Type-B stack for each burner, properly installed. Stack to have appropriate cap and flashing, secured and weather tight. Stack shall be stainless steel as manufactured by Metalbestos.

h) Belt driven blower and motor; blower motor pulley shall be adjustable.

i) Primary safety controls, as necessary and required by codes.

j) Contractor shall provide a thermal cut-off switch mounted above burner.

k) New low voltage thermostat adjacent to existing.

l) New burner safety switch adjacent to existing burner safety switch.

m) Provide disconnect at furnace.

n) Combination fan and limit control.

o) Provide flexible connections where ductwork, and electrical connections, attach to furnace.

p) Furnace burner and blower shall be capable of operating on single-phase 115/230 volt 60 Hz. power.

2.2 Location of Furnace Unit

A. Furnace shall be installed as shown on Drawings.

B. Furnace and ductwork shall be installed with a minimum clearance as shown on Drawings, and as recommended by furnace manufacturer.

C. Furnace shall be installed so as to provide sufficient space for normal servicing.

2.3 Fuel Supply System

A. The Contractor shall furnish and install a fuel oil transfer pump, minimum 1/4 HP, properly sized for friction, lift and gpm, gauges and accessories, to transfer fuel from the above ground storage tank to the burner.

B. The fuel transfer system shall include:

1. Lever-matic fuel shut-offs at burner, transfer pump, and building entrance.

2. Webster OSV Oil safety valves at burner, and transfer pump.

3. A cartridge type oil filter on the pump suction.

4. All necessary suction, supply, and return piping.

5. A reservoir or atmospheric loop to ensure that the burner pump is at a positive suction pressure and that air will not be drawn into the burner pump.

6. Reservoir shall be either a manufactured unit or fabricated of type-L hard drawn copper pipe, 1-1/4" I.D. x 10' minimum, pitched and vented.

C. Transfer pump to operate when burner operates.

D. All piping running through building structure shall be properly sleeved and caulked.

E. All fuel oil lines shall be firmly supported to building structure and shall be without low spots. Piping will not be supported from ductwork or other piping.

F. The main supply is to loop back from the reservoir piping to the above ground storage tank.

G. All lines of copper tubing shall be individually supported by approved type hangers not more than 6' apart.

H. The Contractor shall provide necessary wiring and connections for proper operation of the fuel system.

I. The fuel oil transfer pump shall be installed on an 18" high concrete pad inside the building and as close as practical to the storage tank. The pad shall extend a minimum of 3" on each side of the pump.

J. Fuel oil transfer pump shall be manufactured by Sundstrand, or Webster.

K. Fuel oil transfer pump to be installed with flexible connections and vibration isolators.

L. Provide a disconnect switch at the transfer pump.

M. All exterior piping shall be type K soft drawn copper tubing.

N. Interior piping shall be either type K soft drawn copper tubing or type L hard drawn tubing.

O. Joints for soft drawn tubing shall be flare type. Joints for hard drawn tubing shall be brazed (1000°F or greater).

P. Contractor to provide sufficient soft drawn tubing, where used, to make continuous connections from: fuel tank to transfer pump, pump to reservoir, from reservoir to burner, from reservoir to storage tank.

Q. Contractor shall provide two plastic sleeves with electrical sweeps through concrete wall and floor slab.

R. Provide all valves, checks, filters, anti-syphon valves, and other appurtenances as required.

2.4 Fuel Oil Storage Tank

A. Contractor shall provide one sti-P3 double wall steel combination heating oil and diesel fuel tank as manufactured by Highland Tank & Manufacturing Co.

* B. Tank shall be a 5,000 gallon 300° double wall protected vessel. Shell and head sections shall be a minimum of 10 gauge; internal tank shell and heads shall be 1/4".

C. Internal tank shall be pressure tested to 5 psi, and outer vessel shall be tested to 2 psi and full vacuum.

D. Tank shall be equipped with containment manhole fabricated to receive schedule 40 PVC sleeve for containment of heating oil supply and return piping; and product lines.

E. Other accessories shall include: a spill containment manhole for the fill pipe, monitoring well and manhole, and vent pipe with float valve.

F. Tank to be pitched *slightly toward monitoring well of interstitial cavity.

G. Tank shall be installed in accordance with sti-P3 written installation instructions.

2.5 Chunk Wood Furnace

A. Provide a new Lynndale model 915 wood furnace. 250,000 Btu output, 2000 CFM, 3/4 HP Blower, 115V 1Ø. Provide: poker, grate shaker, Ash Pan, and hot water coil.

B. Provide or fabricate a filter rack, with protective grate, for standard 2" filters, Size to keep air approach velocity below 400 FPM. Nominally 24" x 32", with two 24" x 16" filters.

C. Provide a 12 gauge welded breeching from the furnace to the chimney.

D. Lynndale furnaces are manufactured by:
Lynndale International Inc.
P.O. Box 1154
Harrison, AR 72601

(501) 741-2949

2.6 Ductwork

A. All sheet metal work shall be erected in a first class and workmanlike manner, in accordance with the latest edition of the sheet metal duct manual published by SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc., unless otherwise specified hereinafter in this Section.

B. All duct work shall be supported rigidly and be securely braced as specified, by means of angle irons, rods, channel irons, and cross-breaking and adequately attached by approved means to the structure. Hangers shall not be greater than 4'-0" apart. Ducts shall be securely anchored to structure.

C. All notches for connecting sections of duct, and all grooving seam notches shall not be cut any deeper than necessary to insure tight corners.

D. All ductwork shall be of the best bloom galvanized steel of gauges specified below and shall be stiffened by the use of galvanized rolled steel or aluminum angles.

E. All ducts shall be cross-broken. All exposed ducts shall be especially fabricated so as to present a pleasing appearance, with all joints flush.

F. Ends of duct sections shall be notched and lapped at least one inch and connected with bar slip, S slip or drive caps. Slips shall be made in form of a frame, mitered and riveted at the corners to prevent leakage.

G. Maximum leakage for all duct systems shall be 5% of design flow.

H. Duct elbows shall be square or rectangular, with a radius to width ratio of 1.5 unless otherwise specified.

2.7 Diffusers, Grilles, Louvers

A. Diffusers shall be adjustable pattern, steel construction, with a factory applied white finish, sized as indicated an Drawings. Diffusers shall be installed with a combination louver damper and equalization grid. Square diffuser shall be nominally 24" x 24" suitable far installation on a 2' x 4' lay in suspended ceiling system. Round diffusers shall be suitable for installation on exposed ductwork. Square diffusers shall be Anemostat Model EPLA with LD louver dampers. Round diffusers shall be Anemostat Model C-2 with LD louver dampers, or approved equal.

B. Grilles - provide exhaust and return air grilles sized as indicated in Drawings. Grilles shall be constructed of aluminum with grid openings of 1/2" x 1/2", and 90% free areas, grilles shall have a factory applied white finish. Dampers for balancing shall be provided either with the grilles or in the ductwork. Grilles shall be Anemostat Model GC5, or approved equal.

C. Louvers - provide louvers as indicated in drawings. Louvers for outside air intake and exhaust shall be constructed of 16 gauge steel with all joints welded, provide weep holes for drainage. Louvers shall have fixed blades set at 45° and shall be suitable for installation in the building construction. Louvers shall have a 1/2" mesh screen. Louvers shall have a 120 volt motor operated damper.

PART 3 - EXECUTION

3.1 Installation

A. Install Work in accordance with written manufacturer's instructions.

B. Install gas fired equipment in accordance with ANSI Z223.1 (NFPA 54).

C. Install oil fired equipment in accordance with NFPA 30 & 31, including pressure testing of piping.

3.2 Ductwork

A. Install ductwork in accordance with SMACNA recommendations.

B. Install duct products in accordance with manufacturer's instructions.

C. Install flexible connections specified between fan inlet and discharge ductwork. Flexible connectors shall not be in tension while running.

D. Provide backdraft dampers on discharge of exhaust fans and as indicated.

E. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

F. Install filter gage static pressure tips upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.

G. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage.

H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

I. Slope underground ducts to plenums or low pump out points at l:500. Provide access doors for inspection. Coat buried ductwork with one coat and seams and joints with additional coat of asphalt base protective coating.

J. Encase buried ductwork in 3 inch (75 mm) minimum of concrete. Provide adequate tie-down points to prevent ducts from floating during concrete placement. Introduce no heat into ducts for 20 days following placement of concrete.

K. Connect diffusers or troffer boots to low pressure ducts with 5 feet (1.5 m) maximum length of flexible duct. Hold in place with strap or clamp.

L. Fibrous glass ductwork may be substituted for internally or externally insulated or un-insulated low pressure sheet metal ductwork.

M. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

N. Provide fire dampers at locations indicated. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

O. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

P. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers,at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access.

Q. Support terminal units individually from structure. Do not support from adjacent ductwork. Provide minimum of 5 ft (1.5 m) of 2 inch (50 mm) thick lined ductwork downstream of units.

R. Check location of air outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

S. Provide balancing dampers on duct take-off to diffusers,and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

T. Paint ductwork visible behind air outlets and inlets matte black. Refer to Division 9.

END OF SECTION 15801